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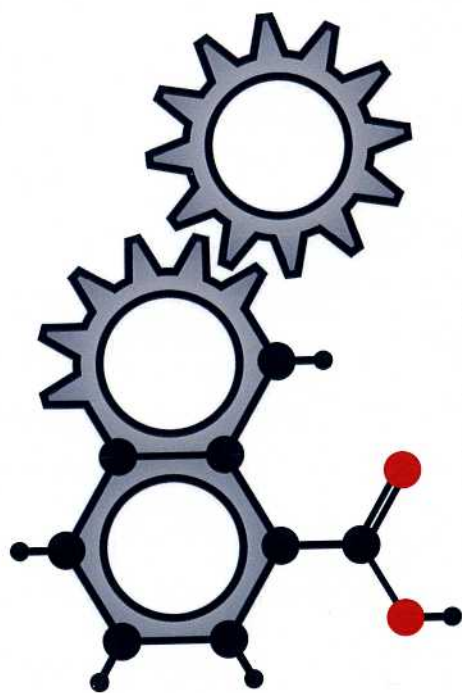
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(Article begins on next page)

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Mechanochemical activation by ultrasound

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The use of mechanical forces to induce chemical reactivity is the oldest and simplest technique used by mankind and one which has existed since before the dawn of science. Mechanical effects can take place in solution and heterogeneous systems, thus accounting for enhanced reactivity.¹ Acoustic cavitation may initiate chemical reactions via the action of mechanical pulses, in close similarity to other, solid-state reactions under mechanical loading. This would otherwise be consistent with the initial and broad concept of mechanochemistry by Ostwald, who used the term for the first time. Ostwald simply recognized that the discipline is a part of physical chemistry that is distinctive from thermochemistry, electrochemistry and photochemistry in terms of energy transmission.² Faraday had observed the rapid decomposition and dehydration of some salts under milling and grinding since the early 1820s. The creation of large tensile forces in liquids via simple friction or agitation is not a simple task. Sonication provides a viable exception by virtue of the mechanical and chemical events it causes via the unique phenomenon of acoustic cavitation.³ The cavitation-based mechanical effects, arise from shear forces, microjets and shock waves that occur outside the bubble, resulting in profound physical changes when solids or metals are present.⁴ These changes include improved mass transfer, particle size reduction, surface erosion and cleaning, and are often accompanied by changes in particle properties. Likewise, mechanochemistry can also generate radicals via the breaking of weak bonds and under extreme surface plasma conditions where covalent crystals are cracked by mechanical impact.^{5,6} Clearly, both scenarios and strategies are different, although goals may be similar. This presentation is aimed at unveiling the features and paths where tribochemistry and sonochemistry meet and highlighting, whenever possible, comparative aspects.^{7,8}

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